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10/580,678	01/25/2007	Marcel Bouffier	12928/10030	5728

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Davidson, Davidson & Kappel, LLC
485 7th Avenue
14th Floor
New York, NY 10018

EXAMINER	
PALABRICA, RICARDO J	

ART UNIT	PAPER NUMBER
3663	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/580,678	BOUFFIER, MARCEL	
	Examiner	Art Unit	
	Rick Palabrica	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's 5/18/10 Amendment, which directly amended claims 12, 14 and 22, and traversed the rejection of claims in the 2/19/10 Office action is acknowledged. To further demonstrate that applicant's claimed invention does not define over prior art, an additional reference is cited in this Office action. Accordingly, the 2/19/10 Office action is vacated and replaced with this one.

Response to Arguments

2. Applicant traversed applied art, Ohasi et al., on the ground that the embodiment shown in Fig. 6, "does not convey the information that only slightly enriched uranium dioxide should be used but rather that slightly enriched uranium dioxide should be used simultaneously with MOX, which is consistent with the low content of U235 in the 'slightly enriched uranium'. (See table 1).

The examiner disagrees.

First, page 13 of Ohashi et al.'s specification states:

> *"As fuel for the fuel assembly shown in Fig. 1, it is possible to use slightly enriched uranium oxide fuel,* ***OR*** *a fuel mixture of uranium oxide and plutonium oxide fuel."*

Clearly there are two alternatives for the fuel material of the assembly: a) enriched uranium oxide fuel ALONE; and b) mixture of uranium oxide and plutonium oxide fuel (MOX) ALONE. Ohashi et al. teach that each type is equally useable for their invention.

Second, even the table 1 cited by applicant confirms the statement in the cited page 13 of Ohashi et al. Note that in the column, "Weight of fissile material", there is an asterisk (*) associated with the fuel layers, “Intermediate zone”, and “Outer peripheral zone”. The explanatory note at the bottom of the table clearly states that instead of plutonium, depleted uranium can be used. Thus, when this uranium is substituted for plutonium in these two zones, all zones do not contain any plutonium, contrary to applicant’s assertion.

Third, Ohashi et al.’s embodiment in Fig. 5, which is directed to a boiling water reactor (BWR), uses only uranium for fuel material, which is again consistent with the above citation in page 13 that the fuel does not have to be MOX fuel. It is a notorious fact that the fuel material for a BWR is the same as that for a PWR, except for the enrichment in U235 isotope in the fuel.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 12-15 and 21-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Ohashi et al. (EP 0 196 655) or Suchy et al. (U.S. 5,094,805) in view of Anthony et al. (U.S. 3,366,546) alone or further in view of Hiraiwa

et al. (U.S. 5,416,813). Ohashi et al. or Suchy et al. disclose the applicant's claim limitations except for the third group of fuel rods.

Ohashi et al.

As to claims 12 and 21, applicant's claim language reads on Ohashi et al.'s PWR fuel assembly as follows (e.g., see Fig. 6, and paragraph bridging pages 29 and 30): a) "first central group" reads on the group of large diameter fuel rods; b) "second group of fuel rods" reads on the group of small diameter fuel rods that have less nuclear reactivity than the first central group of rods. The reference discloses that the fuel for the fuel assembly can be slightly enriched uranium dioxide only (see page 13, lines 24+). See also section 2 above.

As to claim 21, Ohashi et al. has a fuel rod network with a square outer contour.

As to claim 22, it is inherent that when the above Ohashi et al. fuel assembly is used in an operating reactor, at least two of these assemblies are required to achieve criticality and the required operating power level.

Anthony et al. teach that corner rods in a PWR fuel assembly are subject to peak neutron flux and therefore, power peaking problems (see col. 6, lines 73+). It is a notorious fact that power peaking is undesirable because it results in an uneven burnup of fuel rods in a fuel assembly. If applicant is of a different opinion, then Hiraiwa et al. teach that such power peaking is a problem to be avoided, e.g., in a PWR (see col. 4, lines 44+).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus, as disclosed by Ohashi et al.,

by the teaching in Anthony et al. alone or in combination with Hiraiwa et al., to use corner rods of smaller diameter than the non-corner peripheral rods, to gain a further advantage (i.e., avoid power peaking problems), because such modification is no more than the use of a well known expedient within the nuclear art.

As to claims 13 and 23, the examiner interprets "neutron contaminant" as neutron poison or neutron absorber. The fuel rods in Ohashi et al. inherently include neutron poison/absorber, e.g., non-uranium elements or impurities in the fuel material, or fission products that are inherently produced when the rods are used during operation of the nuclear reactor.

As to claim 14, the second group in the above combination extends, for each of the faces of the outer contour of the network of rods, and the third group comprises only the fuel rods at the corners of the outer contour.

As to claim 15, the above combination meets the claim limitation because the masses of uranium 235 in the three groups of rods are different because of the diameter of rods in one group is different from the diameter of rods in another group.

As to claim 21, the fuel rod network in the above combination has a square outer contour (see Fig. 6 in Ohashi et al.).

As to claims 24 and 25, see Fig. 6 in Ohashi et al.

As to claims 26, see Fig. 6 in Suchy et al.

As to claims 27-29, the claimed limitation of a 14x14 and a 15x15 fuel assembly are well known alternative PWR fuel assembly configurations.

The claims are replete with statements that are either essentially method limitations or statements of intended or desired use. For example, "for a pressurized water reactor," "for receiving rods of a control rod cluster", etc. These clauses, as well as other statements of intended use do not serve to patently distinguish the claimed structure over that of the reference, as long as the structure of the cited references is capable of performing the intended use. See MPEP 2111-2115.

See also MPEP 2114 that states:

> A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647.
>
> Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531.
>
> [A]pparatus claims cover what a device is, not what a device does." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 15 USPQ2d 1525,1528.

As set forth in MPEP 2115, a recitation in a claim to the material or article worked upon does not serve to limit an apparatus claim.

The system in the cited reference is capable of being used in the same manner and for the intended or desired use as the claimed invention. Note that it is sufficient to show that said capability exists, which is the case for the cited reference.

Suchy et al.

As to claims 12 and 21, applicant's claim language reads on the Suchy et al.'s PWR fuel assembly as follows (e.g., see Fig. 2, and col. 8, lines 27+): a) "first central group" reads on the group of large diameter fuel rods 8A; b) "second group of fuel rods"

reads on the group of smaller diameter fuel rods 10 (e.g., at the outermost layer) that have less nuclear reactivity than the first central group of rods.

The reference discloses that the fuel for the fuel assembly can be uranium oxide only (see page 8, lines 27+). It is a notorious fact that PWRs employ uranium oxide slightly enriched in the isotope 235 to enhance the fission process and reduce the size of the reactor core.

As to claim 21, see Fig. 2.

As to claim 22, it is inherent that when the above Suchy et al. fuel assembly is used in an operating reactor, at least two of these assemblies are required to achieve criticality and the required operating power level.

Anthony et al. teach that corner rods in a PWR fuel assembly are subject to peak neutron flux and therefore, power peaking problems (see col. 6, lines 73+). It is a notorious fact that power peaking is undesirable because it results in an uneven burnup of fuel rods in a fuel assembly. If applicant is of a different opinion, then Hiraiwa et al. teach that such power peaking is a problem to be avoided, e.g., in a PWR (see col. 4, lines 44+).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the apparatus, as disclosed by Suchy et al., by the teaching in Anthony et al. alone or in combination with Hiraiwa et al., to use corner rods having lower reactivity than the non-corner peripheral rods, to gain the advantage thereof (i.e., avoid power peaking problems), because such modification is no more than the use of a well known expedient within the nuclear art.

As to claims 13 and 23, the examiner interprets "neutron contaminant" as neutron poison or neutron absorber. The fuel rods in Suchy et al. inherently include neutron poison/absorber, e.g., non-uranium elements or impurities in the fuel material, or fission products that are inherently produced when the rods are used during operation of the nuclear reactor.

As to claim 14, the second group in the above combination extends, for each of the faces of the outer contour of the network of rods, and the third group comprises only the fuel rods at the corners of the outer contour.

As to claim 15, the above combination meets the claim limitation because the masses of uranium 235 in the three groups of rods are different because they have different reactivities.

As to claim 21, the fuel rod network in the above combination has a square outer contour (see Fig. 2 in Suchy et al.).

As to claims 24 and 25, see Figs. 1 and 2 in Suchy et al.

As to claims 26, see Fig. 2 in Suchy et al.

As to claims 27-29, the claimed limitations of a 14x14 and a 15x15 fuel assembly well known alternative PWR fuel assembly configuration.

4. Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Ohashi et al. or Suchy et al. in view of Anthony et al. (U.S. 3,366,546), and, where necessary, further in view of Delafosse (applied in the 11/3/09 Office action).

As to claims 16 and 17, it is a notorious scientific fact that the reactivity of a fuel rod can be set either by the amount (or mass) of uranium 235 or the enrichment of uranium 235. Therefore, whether the reactivity is obtained by different masses or different enrichment of uranium 235 is either a design choice or a constraint imposed by the utility-operator of the reactor. If applicant disagrees, then Delafosse, who teaches that mass of uranium is related to enrichment, confirms the examiner's statement (see col. 3, lines 6+ in Delafosse).

As to claims 18-20, the specific levels of enrichment of the groups of fuel rods are matters of design and/or optimization. The enrichment depends upon constraints that include the required power level, burn-up, and fuel management scheme that the utility adopts for the reactor. Additionally, the selected enrichment levels have to be optimized in order for the reactor to generate the maximum energy output at the lowest possible cost.

See MPEP 2144.05 II.A as to matters of optimization within prior art conditions or through routine experimentation.

Note also that MPEP 2144.05.II (Optimization) requires that a particular parameter be recognized as a result-effective variable, i.e., a variable which achieves a recognized result. The enrichment of fuel rods in an assembly is clearly a result effective variable, which achieves varying degrees of benefits. Different enrichments for these fuel rods will affect, e.g., fuel burnup and shutdown margin, but are largely predictably.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rick Palabrica whose telephone number is 571-272-6880. The examiner can normally be reached on 6:00-4:30, Mon-Thurs.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rick Palabrica/ May 27, 2010
Primary Examiner, Art Unit 3663